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CLIMATE CHANGE AWARENESS AND SMALL SCALE MAIZE FARMERS IN MPUMALANGA, PROVINCE, SOUTH AFRICA

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Abstract

Climate change is possibly the greatest environmental challenge facing the world this century. The impact of climate change is a reality and it cuts across all climate-sensitive sectors including the Agriculture sector. It was well documented by several scientists, Intergovernmental Panel on Climate Change and other experts that climate change threatens sustainable economic development and the totality of human existence. This study was conducted in Nkangala District, Mpumalanga province. Mpumalanga province remains the largest production region for forestry and the majority of the people living in Mpumalanga are farmers and they have contributed immensely to promote food security. However, due to the impacts and threaten by climate variability and change which resulted into shortage of food production and changes in the rainfall pattern. It was noted that there is a need for climate change awareness across the agriculture sector including farmers. Random sampling technique was used to select two hundred and fifty one farmers to be interviewed. The questionnaire was administrated to farmers and included matters relating to climate change awareness and agronomic practices including maize production. Data was captured and analysed using software package for social science (SPSS version 20). Descriptive analysis was used to describe data and Univariate regression analysis was conducted to demonstrate the relationship and association of variables. It was noted that the majority of farmers in this province need capacity building and also climate change awareness initiatives which would assist these farmers to build the adaptive capacity, increase resilience and reduce vulnerability.

Keywords: *Climate Change awareness, Nkangala District Mpumalanga Province South Africa, Small Scale Farmers and Maize Production.*

Introduction

The impact of climate change varies globally; however, the problem and the challenges of climate change are becoming more threatening to sustainable economic development and the totality of human existence (Adejuwon, 2004). Small-scale farmers suffer the most because of their dependence on rain-fed agriculture, limited financial capacity, low adaptive capacity, high dependence on natural resources, inability to detect the occurrence of extreme hydrological and meteorological events due to low technology adoption, limited infrastructure, illiteracy, lack of skills, level of awareness and lack of capacity to diversify (Kurukulasuriya & Mendelsohn, 2006a). Maize constitutes about 70 percent of grain production and covers about 60 percent of the cropping area in South Africa. In addition, maize is the main staple food in Southern Africa, and maize production in the country constitutes about 50 percent of the output within the Southern African Development Community (SADC) region (Durand, 2006). A considerable number of studies have been done to investigate the impact of climate change on yields of grain crops such as maize under controlled experiments (Du Toit *et al.*, 2002; Kiker *et al.*, 2002; Durand 2006).

There is very little awareness on climate change in the developing countries (IPCC, 1996). The overall objective of the paper is (i) to create awareness through which farmers can understand the impact and the threats that climate change pose within the agriculture sector. (ii) Build adaptive capacity and reduce vulnerability facing small scale farmers in Mpumalanga Province. This will enable small-scale maize farmers in Mpumalanga province to have basic understanding about the impact of climate change in their areas. This will increase maize production as well as their income for better living.

Materials and Methods

This paper used quantitative design as a well detailed structured questionnaire written in English language as part of the data collection methods. The questionnaires consist of a logical flow of closed ended questions, which address issues related to climate change, agricultural production, yields etc. Data was collected through face-to-face interviews with the farmers and also the help of the extension officer where 251 questionnaires were administered in the study area. The study was conducted in Emakhazeni local municipality within the Nkangala district municipality in the Mpumalanga province of South Africa. Stratified sampling technique was used to select two hundred and fifty one farmers to be interviewed. Data was captured and analysed using software package for social science (SPSS version 20). Descriptive analysis was used to describe data and Univariate regression analysis was conducted to demonstrate the relationship and association of variables. The following econometric model was used to determine association of variables:

$$W_i = \beta_0 + \beta_1 X_i + \epsilon_i$$

W_i is the dependent variable value for person i

X_i is the independent variable value for person i

β_0 and β_1 are parameter values

ϵ_i is the random error term

The parameter β_0 is called the intercept or the value of W when $X = 0$

The parameter β_1 is called the slope or the change in W when X increases by one

Results and Discussion

Table 1. Summary characteristics of household sample in the towns.

Towns	Number of Households	Percentages
<i>Number of Households per Towns in Emakhazeni Local Municipality</i>		
Belfast	50	19.9
Dullstroom	45	17.9
Machadodorp	40	15.9
Noodgedarht	30	12
Stoffberg	30	12
Watervalboven	30	12
Wonderfontein	26	10.3
Total	251	100

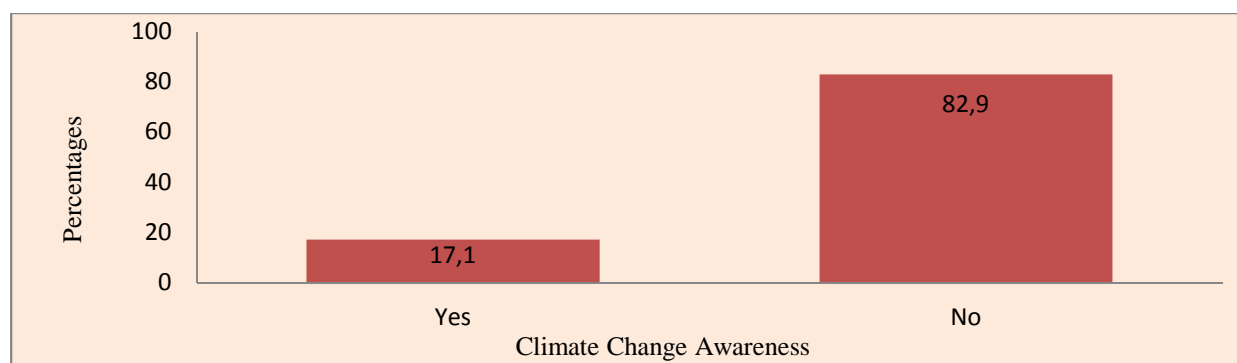


Figure 1. Households Climate Change Awareness

As shown in (figure 1) 82.9 percent of the households are not aware about climate change and only 17.1 percent households indicated that they are aware of climate change. This is not surprising because the majority of households indicated that they are not aware about climate change issues due to: (a) lack of information especially climate advisory, (b) lack of education and lack of assistance from the extension officers. According to Olayinka *et al.*, (2013) awareness of the various causes of climate change is generally below average and less than 50 percent however sees it in terms of reduced agricultural productivity or ozone layer depletion.

Table 2. Univariate regression analysis of potential determinants of climate change awareness and maize production

Variable	Total	(%)	OR [95%CI]
Females	52	20.7	1.00[0.508 – 2.711] 1
Age	251	100	0.99 [0.440 – 2.567] 1
Occupation	251	100	1.10 [0.675 – 3000] 1
Education	251	100	1.01[0.599 – 2899] 1
Source of income (Yes)	179	71.3	0.97[0.127 – 2.112] 1
Climate change info	251	100	1.53[0.76 – 3.555] 1
Extension Service	251	100	1.50[0.68 – 3.44] 1
Importance of info	251	100	1.12[0.576 – 2.666] 1
Quantity of harvest	251	100	101[0.11- 2011] 1

OR= Odds ratio; 95%CI = 95% confidence intervals; 1< = no association; 1> = association

As shown in Table 2, there is association among the following variables: gender, age, occupation, education, source of income, information on climate change, extension service, importance of information on climate and quantity of harvest. This is supported by the fact that their estimate values are more than 1 at 95% confidence interval.

Gender (Female) had significant impact on the level of climate change awareness. According to Table 2, the odds of climate change awareness are 1.00 percent higher for female households than male households. It is widely recognised that climate change does not affect

people equally (UNEP, 2011). A study done by Nhemachena and Hassan (2007) acknowledged women contribution in agricultural sector in relation to climate change especially women's leadership in natural resource management in developing countries.

Age is another significant variable which is associated to climate change awareness. According to Table 2, the odds of climate change awareness are 1.00 percent higher across all age categories. This is not surprising because climate change awareness is made across all age categories even in the schools and out of the school through the use of fliers, posters and many medium. This conforms to the finding of Olajide *et al.*, (2011) who found a significant association between age and knowledge of global warning among undergraduate students of Obafemi Awolowo University (OAU), Ile Ife, Nigeria. According to Bayard *et al.*, (2007) age is positively related to some climate change adaptation measures that are related to agricultural activities.

According to Table 2, the odds of climate change awareness are 1.10 percent higher across all occupations. The study shows that occupations of the respondents have significant impact on the level of climate change awareness. This could be from the fact that some farmers take farming as a full time and some farmers take farming as part time activity but in each case, they all come across awareness either through indigenous knowledge or at their various place of work through adverts. According to Adebayo *et al.*, (2003) occupation has a significant association with awareness of climate change.

According to Anley *et al.*, (2007) improving education and employment is key to stimulate local participation in various adaptation measures and natural resource management initiatives. It was further emphasised by Maddison (2007) that educated and experienced farmers are expected to have more knowledge and information about climate change and adaptation measures to use in response to climate challenges.

According to Table 2, the odds of climate change awareness are 1.00 percent higher across for households who rely on maize as source of income than households who don't rely on maize as source of income. From the study, farmers who rely on maize as a source of income have no other job or extra source of income, than farming activities, thus, they are involve and concern about their environment in relation to their faming activities because they need to provide for the household thereby tends to be more aware of the climate change as an environmental factor responsible for production, unlike farmers who have other source of income apart from farming.

According to Table 2, the odds of climate change awareness are 1.53 percent for households with climate change information. This is shows that climate change information is significantly associated with awareness level of climate change. This is not surprising because a study reported by Luseno *et al.*, (2003) said the more the farmers had access to extension services and information about climate change, the more they adapt to climate change. From this study, the amount on climate change information at farmers' disposal determines the level of awareness of climate change.

According to Table 2, the odds of climate change awareness are 1.50 percent for households with access to extension services. The study shows that access to extension services significantly affects awareness to climate change. Extension services provide an important source of information on climate change as well as agricultural production and management practices. Farmers who have significant extension contacts have better chances to be aware of changing climatic conditions and also of the various management practices that they can use to adapt to changes in climatic conditions. This is also in conformity with Mandleni (2011)

that formal extension positively and significantly affects awareness to climate change and adaptation.

According to Table 2, the odds of climate change awareness are 1.12 percent for households who recognise the importance of climate change information. According to Nhemachena and Hassan (2008), farmers that perceive change in climatic conditions and farmers who have access to climate change information have higher chances of taking adaptive measures in response to observable changes. There is no doubt that climate change awareness plays a very important role in the agriculture sector and if farmers have information in their disposal, the majority of these farmers can make good decisions as it was noted by Mpandeli (2005).

Summary and Conclusion

Due to prevailing problems associated with changes in weather patterns such as high temperatures, changes in rainfall patterns and effect of greenhouse gases (GHGs), which has resulted in low crop production, food insecurity, low income for farmers, there is a need to investigate whether small scale maize farmers are aware of climate change. So this study will enable small scale maize farmers and households in Mpumalanga province to understand the meaning of climate change, by creating awareness through which households and farmers can cope with climate change. This will improve climate change adaptation and thus increasing maize production as well as income for households and farmers.

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